

6.1 Differential Equations and Slope Fields

How can we use  $y' = 2x$  to recover the graph of  $y$ ?

antiderivative, indefinite integral

specific solutions:  $y = x^2$ ,  $y = x^2 + 1$ ,  $y = x^2 + 2$ , ...

general solution:  $y = x^2 + c$

Find all solutions to the differential equation  $\frac{dy}{dx} = \sec^2 x + 2x + 5$  (generally)

$y = \tan x + x^2 + 5x + c$

Find the specific solution that satisfies the initial conditions  $x=0, y=7$

$7 = \tan 0 + 0^2 + 5 \cdot 0 + c$

$7 = c$

$y = \tan x + x^2 + 5x + 7$

definite integral?

$\int_a^x z(t) dt$

$\frac{x}{0} \quad \frac{y'}{0}$

$\frac{1}{1} \quad \frac{2}{2}$

$\frac{0}{0} \quad \frac{1}{1}$

$\frac{-1}{-2}$

Nov 29-9:48 AM

FTC  $F(x) - F(a)$

$x^2 - \sqrt{-1}^2$

$x^2 - (-1)$

$x^2 + 1$

$\int_a^x z(t) dt = F(x) - F(a)$

$= x^2 - a^2$

$F(a) = -1$

$a^2 = -1$

$a = \sqrt{-1} = i$

Dec 1-10:22 AM

Find the general and specific solutions to solve for  $c$

$\frac{dy}{dx} = e^x - 6x^2$  initial conditions:  $(1, 0)$

$y = e^x - 2x^3 + c$

$0 = e^1 - 2 + c$

$c = 2 - e$

$y = e^x - 2x^3 + 2 - e$

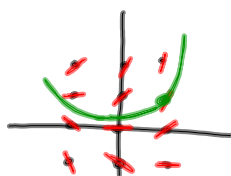
Nov 29-9:54 AM

Solve  $y' = \cos(x)$  algebraically and graphically

Nov 29-9:57 AM

Solve  $y' = x + y$  graphically

$$x=1 \quad y=1$$



x	y	y'
0	0	0
1	1	2
1	0	1

Nov 29-9:58 AM